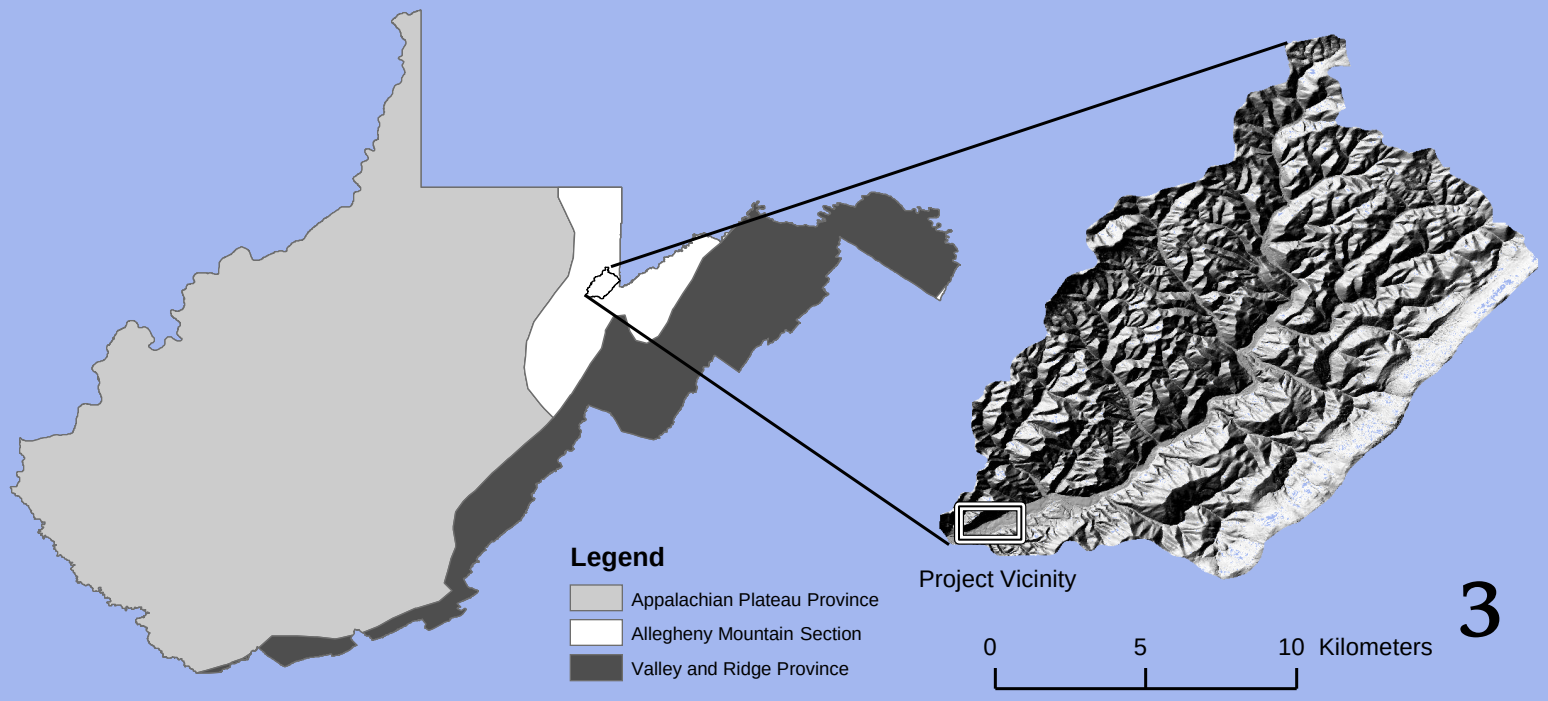
Can the BANCS model parameters be used to predict streambank erosion at an actively eroding and restored stream reach?

Horseshoe Run: Tucker County, WV

Abby McQueen
West Virginia University / Canaan Valley Institute

November 16, 2011

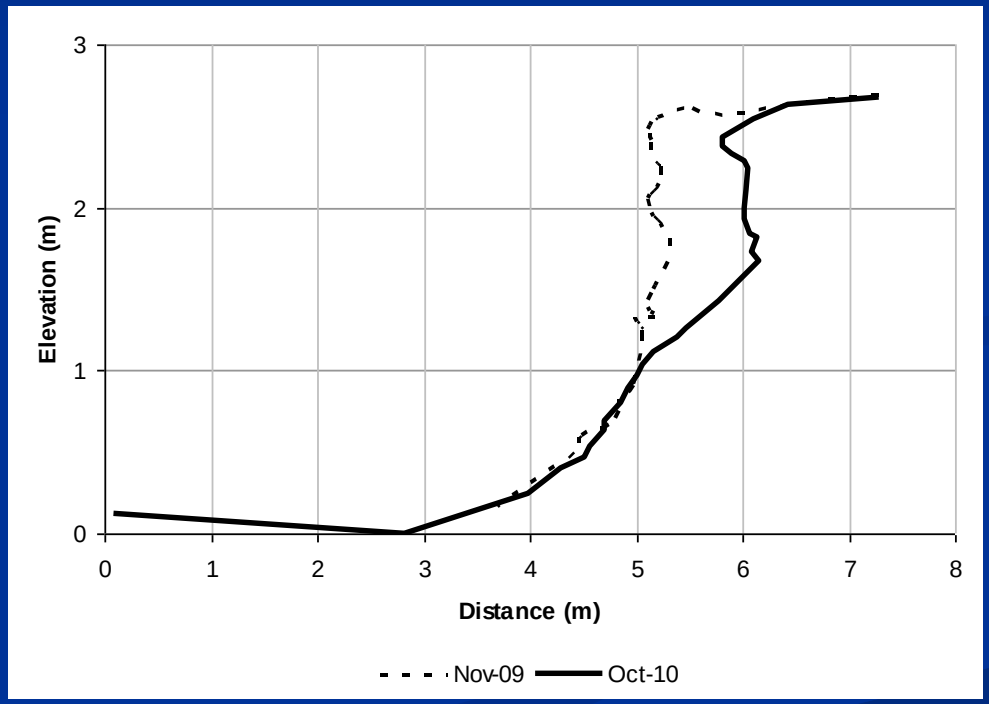
Study Area 1.5 km



Impaired and Restored Reaches

Methods

- Bank Profiles
- Cross Section
- Long Pro
- Pebble Counts
- Stage



BANCS Model Parameters

BEHI

- Bank height
- Root depth
- Root density
- Bank angle
- Surface cover
- Bank material
- Bank layers

NBS

- Near bank depth

BANCS

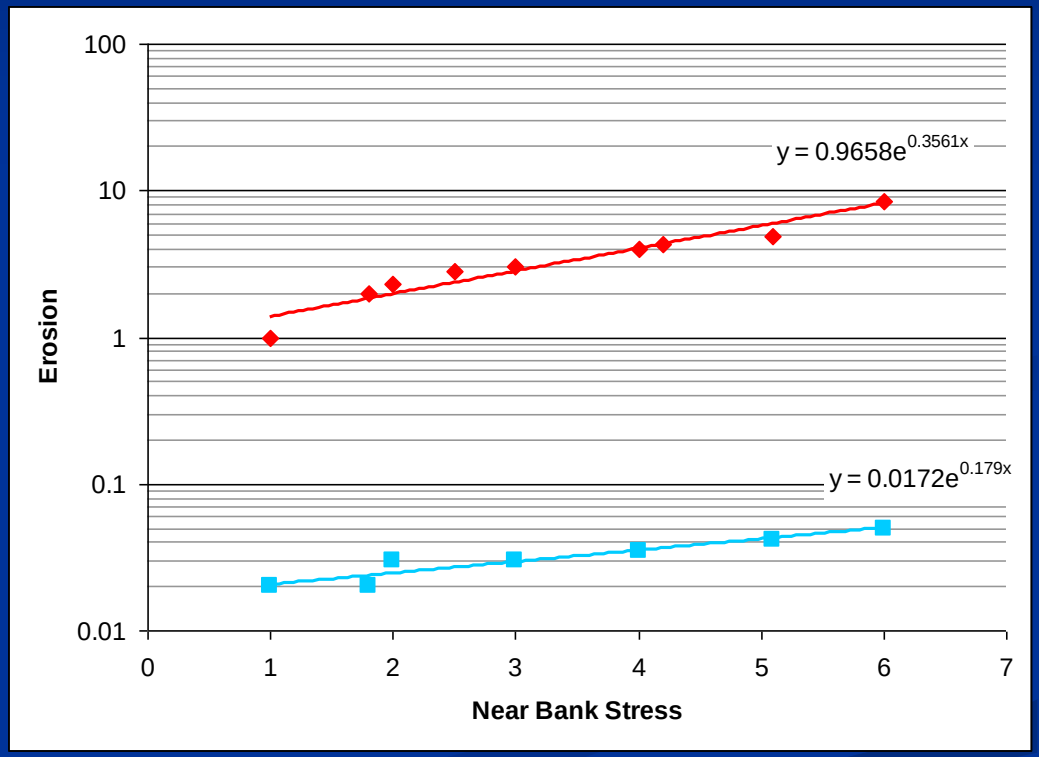
- BEHI Variables are scored from 1-10

$$V_1+V_2+\ldots V_7 = V_{total}$$

- V_{total} into groups

V_{total} (5-9.5) = Very Low

V_{total} (46-50) = Extreme



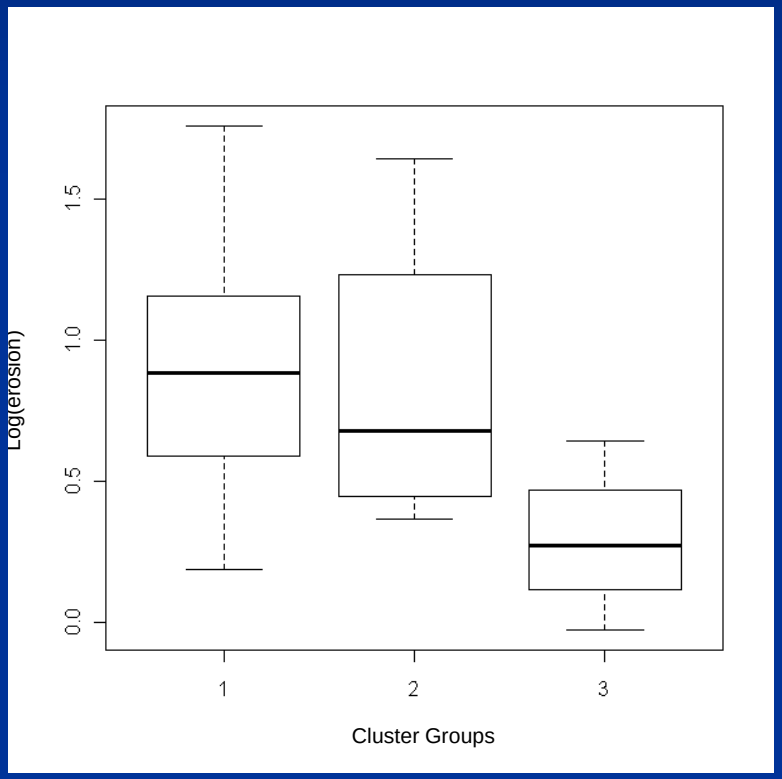
Objectives

- Are there "groups" of streambanks with similar conditions that have consistently more or less erosion?
- Which parameters are most important in explaining the variation in erosion at the impaired and restored reaches?

Measured Erosion

- Min – 0.02 m^2
- Mean – 1.03 m^2
- Median – 0.55 m^2
- Max – 5.33 m^2

Groups of Streambanks



Group 3

- Low bank angles
- Some surface protection
- Intermediate rooting depths and densities

Impaired Reach - Regression

Parameter		Included in regression model				
	R^2					
	0.58	0.66	0.79	0.80	0.82	0.84
Bank angle						
Bank material						
Near bank depth						
Weighted root density						
Root depth ratio						
Surface Protection						
Bank height						
Stratification						

Restored Reach - Regression

Parameter	Included in regression model			
	R^2			
	0.28	0.56	0.66	0.94
Bank angle				
Surface protection				
Weighted root density				
Root depth ratio				
Bank height				
Near bank stress				

Streambank Erosion Processes

- Subaerial processes

- Mass Failure

- Fluvial Entrainment

BANCS Conclusions

- Dense shrub and herbaceous vegetation may provide more stability than heavy trees in incised streams

- Considering dominant type of erosion when assessing or monitoring individual stream reaches is important

Acknowledgements

- US EPA RePLUS
- USDA ARS
- CVI
- WVU